

**PACKAGING ASSEMBLY AND METHOD****Field of the Invention**

5 The present invention relates generally to hardcopy consumables, particularly but not exclusively to inkjet printer cartridges, and to apparatus and methods for packaging and storing such consumables.

**Background to the Invention**

10 As is well known in the art, conventional inkjet printers generally employ one or more inkjet printheads, which eject drops of ink onto a page or sheet of print media.

Such printheads generally form part of a cartridge that contains a supply of ink for use with the associated printheads. Such printheads or cartridges generally have a finite working life. In order to prolong the usable life of printers that employ these  
15 printheads or cartridges, they are usually made to be replaceable.

In order to avoid blockages of ink that might occur in the ejection nozzles and/or ink leaking out of the ink ejection nozzles of replacement printheads or print cartridges before it is installed in a printer, an adhesive tape is bonded to the nozzles plate of  
20 the printhead. In this manner, the nozzles of the printhead may be temporarily sealed. The tape also serves to protect the normally fragile nozzle plate from damage whilst it is being stored or transported.

Prior to installing the cartridge in a printer, a user must remove the protective tape.  
25 For some users this can be a difficult procedure. In some cases, users install cartridges in printers without first removing the protective tape, either because they forget to do so, or because they do not appreciate that it should be removed prior to installation. If a cartridge is installed without the protective tape having first been removed, the cartridge and/or the printer will not function and may be damaged.

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### Summary of the Invention

According to one aspect of the present invention there is provided a package adapted to contain a hard copy consumable, the package comprising a protection element, the element being connected to the package and having a surface adapted to be removably connected to a portion of the consumable, such that the element is arranged to be removed from the portion of the consumable by the action of removing the consumable from the package.

The present invention also extends to methods of manufacturing such a package and a method of packaging a hardcopy consumable in such a package. Further aspects of the invention will be apparent from the appended claims.

### Brief Description of the Drawings

For a better understanding of the invention and to show how the same may be carried into effect, there will now be described by way of example only, specific embodiments, methods and processes according to the present invention with reference to the accompanying drawings in which:

FIG. 1 is a perspective view of a conventional inkjet cartridge.  
FIG. 2 is an enlarged view of the snout of the cartridge illustrated in FIG. 1.  
FIG. 3 is a schematic, perspective view of a package according to one embodiment of the invention.  
FIGS. 4 to 8 form a sequence of diagrams illustrating the removal of an inkjet cartridge from the package illustrated in FIG. 3.

### DETAILED DESCRIPTION OF THE INVENTION

In the following detailed description of exemplary embodiments of the invention, reference is made to the accompanying drawings that form a part hereof, and in which are shown by way of illustration specific exemplary embodiments in which the invention may be practiced. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments may be utilized, and logical, mechanical, and other changes may be

made without departing from the spirit or scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims.

5           FIG. 1 illustrates a typical, replaceable inkjet cartridge 2. The cartridge has a body portion 4 in which an ink reservoir is contained. It also has a snout portion 6. The cartridge also has a conventional inkjet printhead 8, which is located in the region of the snout portion, and which can be seen in FIG. 2. FIG. 2 illustrates an enlarged side elevation view of the snout portion 6, viewed along the line "X", shown  
10 in FIG. 1. The printhead 8 can be seen from side on in FIG. 2. For the sake of clarity, it has been illustrated as standing proud of the snout portion 6 of the cartridge. The printhead has a number of ink ejection nozzles (not shown), through which ink drops may be selectively ejected in a known manner. The ink exits the nozzles from the printhead 8 through a surface known as a nozzle plate, which is referenced 8a in  
15 the figure.

FIG. 3 schematically illustrates the exterior of a package 10 according to one embodiment of the present invention. The package has, as illustrated in the figure: a top surface 10a; a bottom surface 10b; a left hand end wall 10c; a right hand end wall 10d; a near side wall 10e; and, a far side wall 10f. Thus, in this embodiment the  
20 package is a generally box shaped. In other embodiments, the package may be of any reasonable shape. The package 10 is suitably sized to accommodate an inkjet cartridge such as that illustrated in FIG. 2. In other embodiments, however, the package may have any reasonable dimensions. The package 10 is also arranged to be closed, or sealed, once the inkjet cartridge is located within the package. This  
25 may be in a conventional manner. The exterior structure of the package, including the surfaces 10a-f may be made from any suitable material, such as paperboard, cardboard or plastic, or from a combination of such materials. Such exterior structures are available from Kartoncraft™, 84-85 Lagan Road, Dublin Ind. Est., Dublin 11 and Smurfit Carton™, Tonlegee Road, Coolock, Dublin 5.

30           FIG. 4a illustrates the package 10, with the top surface 10a removed such that the interior of the package may be seen. As can be seen from the figure, an inkjet cartridge 2 is located within the package 10. In practice, a conventional

locating structure may be present in the inside of the package 10 in order to locate the inkjet cartridge 2 stationary in a desired position. However, for the purposes of clarity, this has been omitted from the figure. The package also has a protective tape assembly 12. The tape assembly in the present embodiment has three functional portions, 12a, 12b and 12c. In the present embodiment, the portion 12a is bonded to the interior surface of left hand end wall 10c, although in other embodiments it may be bonded to other suitable surfaces. The portion 12c is bonded to the exterior surface of the nozzle plate 8a of the printhead. The portion 12b joins the portions 12a and 12c. This is more clearly illustrated in FIG. 4b.

FIG. 4b illustrates the package and cartridge assembly shown in FIG. 4a viewed along the lines Y-Y. In this figure, for the sake of clarity, the portions of the tape 12a and 12c are shown as being slightly offset from the surface to which they are bonded; 10c and 8a, respectively. In this figure, it can be seen that the portion 12b of the tape, which joins the portions 12a and 12c, forms a loop that is located substantially above the snout portion 6 of the cartridge 2. Furthermore, apart from being connected to the portions 12a and 12c of the tape, the portion 12b of the tape is not attached to other structures in the present example.

The portion 12c of the tape is bonded to the surface 8a of the printhead in a conventional releasable manner; that is to say that it may be removed from the printhead by a force generally applied by a user. In the present example, it is arranged when bonded in position to substantially cover the nozzles orifices in the printhead to prevent ink leakage, to prevent ink ejection nozzles from becoming blocked, and to protect the nozzle plate from mechanical damage. In the present embodiment, the tape may be of the conventional type used for such purposes. Generally such tapes are manufactured from a rubber or plastics material, such as a PVC or PET material, and come pre-prepared with a heat-activated adhesive present on the side of the tape that is to be bonded to the printhead. Thus, in the present example, the tape portion 12c is located in position, overlying the printhead, and heat is applied to the tape portion 12c in order to bond it to the printhead. It will be understood by the skilled reader, however, that any suitable conventional adhesive may be used for this purpose.

The portion 12a of the tape is bonded to the inner surface 10c of the package in a conventional manner, such that the bond may be considered to be relatively permanent. The skilled reader will appreciate, from the following description, that when the tape is tensioned between the package and the cartridge, it is desirable that the tape remains attached to the package, at the surface 10c, and becomes detached from surface 8a of the printhead. It will be understood that to achieve this various factors may be considered to be important. These may include, for example: the materials that are to be bonded; the adhesive or adhesives used; and, the mechanical arrangement which is used to tension the tape. Thus, the materials used for the tape and the adhesives used, and indeed the package material that forms the internal surface 10c may be determined using conventional techniques according to particular operational requirements.

In one embodiment, the three portions of the tape 12a-c are made from a continuous strip of a single material; i.e. each of the three portions 12a-c is made from the same material. In other embodiments, one or more of the three portions of the tape may be made from materials that are different from the materials used from the other portions.

In one exemplary embodiment, the portion 12 is made of two parts. The portion 12a is a paper based material, such as P/N 51641-80035 , manufactured by York Labels™ , 405 Willow Springs Lane, PO. Box 1309, York, PA 17405, US. The portions 12b and 12c are formed by a single part, which is a PVC based material, such as P/N: SPV 225PHP, manufactured by Nitto™ , Eikelaarftraat 22, 3600 Genk, Belgium. The adhesive used to bond the portion 12a of the tape to the internal surface 10c of the package may be adhesive PHC/75900 manufactured by H.B. Fuller™ GmbH, D-21335, Lunenburg, Ander Roter Bleiche 2-3, Germany. In this embodiment, the package material that forms the internal surface 10c may be conventional paperboard. The portions of the tape 12a and 12b may be joined together by any suitable conventional means, such as a mechanical fastener or a heat treatment causing a bond to form between the two portions.

Various methods may be used in order to assemble the cartridge, with the tape in place, in the packaging. In the present embodiment, however, the tape portion 12a-c is first located on the cartridge, prior to the cartridge being inserted in

the package. The tape portion is located on the cartridge such that (a) the portion 12c of the tape is correctly bonded over the surface 8a of the printhead, and (b) so that the portion 12a, pre-treated with adhesive, is correctly presented such that on inserting the cartridge into the package, it correctly adheres to the end wall 10c of the package. It will be appreciated that the process of locating the tape portion on the cartridge may be carried out by hand or using an automated process. Similarly, the process of inserting the cartridge, together with the correctly located tape, into the package may be carried out by hand or using an automated process.

It will be understood by the skilled reader that in other embodiments of the invention, the tape portion may be formed together with at least part of the packaging; that is to say as a single part or piece, thus obviating the need for adhesive bonding of the tape to the packaging. In other embodiments of the invention, the tape portion may be connected to the packaging using conventional mechanical fixtures, such as clips; again obviating the need for adhesive bonding of the tape to the packaging.

In the present embodiment, in order to remove the cartridge 2 from the package 10, the user firstly opens the package in a conventional manner. In the present example, the right hand end wall 10d is removed, or unfolded. This may be facilitated by the presence of perforations and user instructions, for example. The user then grips the portion of the cartridge 2, which is exposed by the removal or opening of the right hand end wall 10d, and draws the cartridge 2 out of the package 10 in the direction of the arrow "A", shown in FIGS. 5a and 5b. FIGS. 5a and 5b show views corresponding to those of FIGS. 4a and 4b, respectively, with the cartridge 2 partially withdrawn from the package 10. In FIGS. 5a and 5b, the cartridge 2 has only been withdrawn by an amount sufficient to take up the slack in the loop that was formed by the portion 12b of the tape. Thus, the portion 12b of the tape is substantially untensioned in the position shown in FIGS. 5a and 5b. Thus, it will be understood that the portion 12c of the tape, at this point, remains fully bonded to the surface 8a of the printhead. Similarly, the portion 12a of the tape remains fully bonded to the inner surface the interior surface of left hand end wall 10c of the package.

As the user continues to withdraw the cartridge 2 from of the package 10 in the direction of the arrow "A", the tension in the portion 12b of the tape increases and the portion of the tape 12c progressively debonds, and separates from the surface 8a of the printhead. This is illustrated in FIG. 6, which illustrates a simplified partial  
5 view of the package and cartridge assembly shown in FIG. 5b, but with the cartridge withdrawn to a greater extent. As can be seen from the figure, the portion 12b of the tape is now tensioned and approximately half of the portion 12c of the tape has debonded and separated from the surface 8a of the printhead. Thus, approximately half of the area of the surface 8a of the printhead is now exposed. FIG. 7 illustrates  
10 a view similar to that of FIG. 6, in which the cartridge 2 has been further removed from the package 10. At the illustrated position, the portion of the tape 12c that is still bonded to the surface 8a of the printhead is very small. At this position almost all of the surface 8a of the printhead is now exposed. When the user withdraws the cartridge 2 further from the package 10, the final portion of the tape 12c debonds  
15 from the surface 8a of the printhead. The user then removes the cartridge 2 completely from the package 2. This position is illustrated in FIG. 8. As can be seen from the figure, the portion 12a of the tape remains fully bonded to the inner surface 10c of the package. Additionally, the other end of the tape 12d, which was bonded to the surface 8a of the printhead, now lies loose within the package 2.

20 The user may now discard the package and use the cartridge. It will thus be appreciated that the act of removing the cartridge from the package, according to the present embodiment, also serves to remove the protective nozzle tape from the cartridge, rendering the cartridge immediately ready for use.

It is noted that, although specific embodiments have been illustrated and  
25 described herein, it will be appreciated by those of ordinary skill in the art that any arrangement that is calculated to achieve the same purpose may be substituted for the specific embodiments shown. For example, in the above example, the tape portion allowed a certain degree of movement, or withdrawal, of the cartridge before one end of the tape was caused to debond from the cartridge. In practice, this need  
30 not be the case. In one embodiment, debonding may be initiated with the first movement of the cartridge relative to the package. Furthermore, it will be appreciated that in certain embodiments of the invention, coverings or attachments

may be removed from devices other than hardcopy supplies, when they are removed from their packaging; for example, a layer used to protect the screen of an item of equipment, such as a mobile phone may be removed by the act of extracting the equipment from its packaging. Additionally, it will be appreciated that in other  
5   embodiments of the invention, a protection element may be retained relative to an item, such as a printhead, by a mechanical fastener instead of by an adhesive. Such a protection element may, for example, take the form of a plastic cap, arranged to clip into place over the printhead, thus hermetically sealing the printhead. Other applications and uses of embodiments of the invention, besides those described  
10   herein, are amenable to at least some embodiments. This application is intended to cover any adaptations or variations of the present invention. Therefore, it is manifestly intended that this invention be limited only by the claims and equivalents thereof.